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Development of The ABK-KU Application in Conducting Developmental Assessments in Children with Special Needs

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Abstract: This study aims to develop the ABK-KU application as a digital instrument to support practical, accurate, and sustainable assessment of the development of students with special needs. The research method used is Research and Development (R&D) with the ADDIE (Analysis, Design, Development, Implementation, Evaluation) model. Subjects in this study consisted of three expert validators, 16 teachers for the practicality test, and 36 teachers for the effectiveness test. Data were analyzed descriptively and quantitatively using percentages and statistical tests of N-Gain Score and Wilcoxon Signed-Rank Test. The results of validation by material, media, and language experts show that this application has a high level of feasibility of 88.85%. The average percentage of practicality assessment of the ABK-KU Application obtained a percentage of 92% in the very practical category. The results of the pretest and posttest obtained the average N-Gain score of 0.8356 (83.56%), while the results of the Wilcoxon signed-rank test showed that Z count was -5.234 and the significance value was 0.001. These results show that ABK-KU is easy to use by teachers and can present child development data in a structured and systematic manner, and provide program recommendations from the assessment results automatically. ABK-KU is worth using as an alternative innovative solution to support the assessment of the development of students with special needs in special schools.

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Introduction

The Merdeka Curriculum emphasizes a student-centered teaching and learning process and competency-based assessment (Kharimah et al., 2023; Kholid et al., 2024; Wardana, 2024). Teachers must be able to design innovative learning according to the characteristics of each student, especially children with special needs. Assessment serves to determine the initial potential of students (Yang & Li, 2018) so that teachers are able to design learning based on the characteristics, needs, and individual abilities of students. (Frey, 2019; Marlina, 2015).

Assessment of students with disabilities is an important part of special education services (Hurwitz et al., 2020). Teachers and other professionals can provide interventions tailored to each child's needs by using appropriate assessment tools to gain a comprehensive understanding and support of the child's developmental condition (Meuser et al., 2023). Assessment allows teachers to ensure that students have mastered a skill or knowledge. (Algethami, 2022) as well as students' dominant learning styles (Rahmahtrisilvia et al., 2021, 2022).

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This assessment consists of developmental and academic assessments. The developmental assessment consists of motor, perceptual, coordination, communication, social, and emotional aspects (Algethami, 2022; Meuser et al., 2023). Academic assessments consist of aspects of writing, reading, and arithmetic (Alghazo et al., 2022). Developmental assessments for students with special needs are specifically designed to understand their progress and developmental needs. Assessments aim to support educational planning and services based on the unique characteristics, needs, and abilities of each student to create an effective learning process (Cosar, 2024). Despite this, there are still several challenges faced in the field in terms of implementing assessments, including the scarcity of tools that are suitable for the characteristics of students with special needs, lengthy assessment procedures, and the absence of data integration that allows for ongoing developmental analysis as well as teachers' limited understanding of the importance of assessments.

Digital technology offers a great opportunity to improve the efficiency and quality of learning in special education compared to the traditional way (Amani et al., 2024; Amani, Luthfi, et al., 2021; Rahmahtrisilvia et al., 2024). The development of app-based assessment instruments is one relevant innovation. Digital instruments not only facilitate data collection and analysis but also allow for continuous data storage, which enables more systematic and responsive reporting on the dynamics of student development (Reisoğlu, 2022). With the demand for comprehensive and continuous assessment, special school teachers still face a lack of developmental assessment instruments that are practical and adaptive to the needs of students with special needs. The absence of app-based developmental assessment instruments developed specifically to assist teachers in schools indicates an urgent need for innovations that integrate technology and special education approaches.

ABK-KU is an application used to determine the general development of students presented in the form of an application with Progressive Web App (PWA) with WordPress CMS. ABK-KU can be accessed through the website with the URL https://abkku.my.id/ and the application on an Android mobile. The app is used by teachers and educators in special schools to assess various aspects of a child's development, including motor, perceptual, communication, emotional, and social skills.

Most developmental assessment instruments circulating in special schools today are general and not tailored to the characteristics of children with special needs. In addition, the assessment process is also still carried out manually using a printed format, so it takes longer. Therefore, by utilizing digital technology in conducting developmental assessments, it will make it easier and faster for teachers to carry out accurate assessments. So that it can help teachers in the field in carrying out developmental assessments practically and efficiently.

Research Method

This research uses a Research and Development (R&D) approach with the ADDIE model (Muruganantham, 2015). There are five stages of ADDIE, namely analysis, design, development, implementation, and evaluation. The analysis stage begins with identifying the need for an application-based developmental assessment, analysing the literature review, understanding the concepts and theories underlying the development of the assessment instrument and identifying the target and specific characteristics of the developmental assessment instrument. The design stage is carried out with a structured and systematic plan by developing a developmental assessment instrument format for students with disabilities. Furthermore, determining the indicators and items of the developmental assessment instrument in accordance with the concept of development in students then making assessment criteria from the assessment carried out. Then make the application design and

procedures for filling out the application from the development assessment instrument that has been made. The development stage is to validate the validity of the ABK-KU application in terms of content, construct and practicality so as to produce a product that is validated by experts. The implementation stage is where ABK-KU products are implemented in the real world by teachers for students with disabilities. The last stage is evaluation to provide constructive feedback to users.

The subjects in this study were experts in the development of children with special needs, experts in technology, and linguists as validators who validated the validity of the ABK-KU application. The practicality test was conducted on 16 special school teachers, while to see the effectiveness of ABK-KU, it was applied to 36 teachers. The teachers were spread across the Padang City area. Data collection techniques using observation, interviews, questionnaires, and documentation (Mazhar et al., 2021). Observations were made by observing the developmental assessment process using observation instruments. Interviews were conducted face-to-face with class teachers using interview instruments to obtain information about the implementation of assessments in special schools spread across Padang City. Questionnaires were used to validate the ABK-KU application by expert validators so that it is suitable for use. Documentation in the form of photos or videos and developmental assessment documents is applied to students.

Observation and interview data were analyzed descriptively and qualitatively (Stanley, 2023). While the questionnaire data is analyzed quantitatively from the results of expert validation to see the feasibility of ABK-Ku by using analysis in the form of percentages (Aeron & Mehta, 2013). One-group pretest and posttest data using N-Gain scores and the Wilcoxon signed rank test. Quantitative analysis using Microsoft Excel and IBM SPSS 29 software.

Results and Discussion

Empirical conditions of developmental assessment implementation

The development of ABK-KU begins with a needs analysis by collecting information through observations of learning implementation and interviews related to developmental assessments and the media used. So that an overview of product development is obtained, which is tailored to the conditions and needs. The identification results show that the assessment currently applied by teachers has not been able to accommodate the individual needs of students with special needs in the classroom, both in terms of format and appearance, approach, and ease of access. The characteristics of students who can be assessed based on the ABK-KU application are students with visual, hearing, intellectual, physical, and Autism Spectrum Disorders (ASD).

The aspects of development that are assessed using the ABK-Ku application are motoric, communication and language, perception, and social skills of students with special needs. The motor development aspect consists of fine and gross motor skills (Amani, Annisa, et al., 2021; Gonzalez et al., 2019). Students with motor barriers will affect activities related to mobilization (Choong et al., 2018) as well as related to learning process activities such as writing, drawing, and activities that involve other motor activities (Suggate et al., 2023). Aspects of communication and language development are one of the important aspects in conducting developmental assessments because aspects of communication and language have dynamic barriers to each characteristic of children with special needs (Bruinsma et al., 2024; Lei et al., 2022). For example, deaf students experience barriers in verbal communication, autistic students have barriers in receptive and expressive language, and students with cerebral palsy experience barriers in language processing. Then, children with autism

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spectrum disorders who have difficulty in communicating both verbally and non-verbally (Rahmahtrisilvia et al., 2019).

In terms of the development of perceptual abilities, students with special needs experience auditory perceptual barriers in the ability to recognize, distinguish, and understand sounds (Chundury et al., 2021). In the visual aspect, students with special needs experience obstacles in understanding the visualization process in shape, direction, and size. (Choi et al., 2022). Students with special needs also experience obstacles in aspects of development that involve eye and hand coordination activities, such as writing, eye and foot coordination activities, activities that involve eye and foot movements, such as kicking, and activities related to kinesthetic and other body movements (Sutapa et al., 2021). The social development aspects of children with special needs experience obstacles in interacting, establishing social relationships with peers and their environment, and adapting to the social environment (Ralić & Marković, 2024).

Diagnostic assessment in the Merdeka Curriculum is used by teachers to evaluate characteristics, potential, developmental stages, needs, and learning achievements (Hadziq, 2023). In the Merdeka Curriculum, assessments conducted for students with special needs usually cover communication aspects, socio-emotional aspects, learning aspects, and neuromotor aspects. The results of this assessment are incorporated into learning programs and designs based on the potential of each student.

Development and Validation of ABK-KU Application

The development of the ABK-KU application uses the Progressive Web App (PWA) method, which is responsive for use on various devices, easily accessible even if there is no internet signal. Then using WordPress CMS to build the ABK-KU application as a convenience for managing assessment data, reports, and other supporting materials, and the results of the assessment are sent directly to the email that is inputted when filling in the form of a PDF. The display of the ABK-KU application can be seen in Figure 2 below.

Figure 1. The display of the ABK-KU

The ABK-KU application provides student demographic information such as name, age, gender, and so on. The developmental assessment results also provide follow-up recommendations for designing learning programs according to the needs of each student with special needs. The results of the assessment of the ABK-KU application by experts can be seen in Table 1 below.

Table 1. Expert validation results

No	Aspect	Total (%)	Category
1	Material Expert	90.67	Valid
2	Media Expert	90	Valid
3	Language Expert	85,88	Valid

Based on the validity results by the material expert validators, the material on the ABK-KU Application is valid with minor revisions (90.67%) on the construction aspects of the ABK-KU Application-based instrument development and content feasibility. Media experts stated that it was valid with a valid category with minor revisions (90%), which included layout design, cover design, and content design, and the validator had stated that the learning media developed was ready to be tested. Then the language showed 86% with a valid category from all aspects in the language validity questionnaire, namely conformity with Indonesian language rules, suitability for child development, use of punctuation marks, and the use of language

Effectiveness Test of ABK-KU Application

The average percentage of teacher response assessment of the ABK-KU application obtained a percentage of 92% in the very practical category. The ABK-KU App has met the predetermined criteria. The results of the teacher's response to the ABK-KU Application are included in the very good category in terms of practicality, so that it can be used as one of the media in conducting developmental assessments of students with special needs. Then the results of the ABK-KU effectiveness test can be seen in Table 2 below.

Table 2. Effectiveness test results based on N-Gain

	N	Minimum	Maximum	Mean	Std. Deviation
Ngain_Score	36	.52	1.00	.8356	.13031
Ngain_Persen	36	52.00	100.00	83.5612	13.03099
Valid N (listwise)	36				

The effectiveness of the ABK-KU App is seen through the assessment of teacher responses after using the ABK-KU App. The ABK-KU developed is said to be effective if the developmental assessment aspects can identify the obstacles in the aspects of developmental assessment. The effectiveness of ABK-KU uses a one-group pretest and posttest for special education teachers in Padang City. The results of effectiveness based on N-Gain from 36 teachers who have done the pretest and posttest obtained an average N-Gain score of 0.8356. While the average percentage is 83.56%. So it can be concluded that the use of the ABK-KU application is effective in conducting developmental assessments.

Table 3. Results of the normality assumption test

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Pretest	.219	36	<.001	.873	36	<.001
Postest	.172	36	.009	.872	36	<.001

a. Lilliefors Significance Correction

The results of the normality test are focused on the Tests of Normality table. The amount of data used is <50, so use the Sig. column in the Shapiro-Wilk section. The assumption of normality is met if the Sig value is > 0.05 or the specified significance level. Conversely, the assumption of normality is not met if sig. < 0.05 or the specified significance level. Based on the results of the analysis conducted, it was found that the sig value. < 0,05. This indicates that the assumption of normality is not met for pretest and posttest data, so the non-parametric statistical test used in this study is the Wilcoxon signed-rank test.

Table 4. Wilcoxon signed-rank test results

	Postest - Pretest
Z	-5.234[b]
Asymp. Sig. (2-tailed)	<.001

a. Wilcoxon Signed Ranks Test
b. Based on negative ranks.

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The results of the Wilcoxon signed-rank test on the use of the ABK-KU application show that the Z count is -5.234 and the significance value is 0.001. So it can be concluded that there is a difference in the value of the results before and after using the ABK-KU application in the implementation of developmental assessments of children with special needs.

The implementation of the ABK-KU application that has been designed and developed in a real situation, namely in the classroom for students of a special education school in Padang City, with a total of thirty-six teachers, to assess the practicality and effectiveness of the product developed. The results of the trial will be used as a reference in revising the ABK-KU Application, developed based on aspects of attractiveness, appearance, presentation of instruments, assessment, and aspects of usefulness through the product practicality instrument sheet. The trial was conducted four times, with details of the test time for one meeting of 35 minutes. During implementation, the product design that has been developed is applied to actual conditions. Furthermore, an initial evaluation was carried out at the implementation stage to provide feedback.

Developmental assessment based on the ABK-KU application can be done anywhere and at any time. The ABK-KU application can support student-centered learning and is characterized by the characteristics of the developmental aspects of students with special needs. The benefits that can be obtained from using the ABK-KU Application are that teachers can carry out assessment activities anywhere and anytime and the ABK-KU Application is equipped with aspects of students' general basic development that enable teachers to compile and make learning plans that are by the obstacles experienced by children, as well as carry out learning activities that improve abilities in aspects of development that are experiencing obstacles. This is in line with research conducted by (Komanchuk et al., 2023), that digital assessments can compensate for conventional administration, are easy to access, and make it easier to conduct early detection in children. In addition, it is very effective, efficient, and user-friendly (Hasan et al., 2023).

Through the ABK-KU App-based assessment, teachers understand the indicators of the aspects of development that are experiencing obstacles, so that teachers can identify the slow progress or development of children. The presentation of assessment instruments is organized in a systematic, directed manner and makes it easier for teachers to understand each instrument item given to students (Surahman & Wang, 2022). Assessment is the process of documenting and collecting evidence of a child's growth and development (Koenarso, 2023). The process of collecting data and information about children's growth and development is called child development assessment (Latifah & Safrida, 2025; Saracho, 2023). This assessment focuses more on cognitive development, which includes perception, language, communication, motor skills, memory, concentration, emotions, and social skills. Cognitive development also includes aspects such as perception, language, communication, and emotions. The results of the assessment help in making decisions about the right learning program for the student (Owan et al., 2023; Qorib, 2024).

The development of assessments based on the ABK-KU App can encourage teachers to understand aspects of child development as a basis for lesson planning. Developmental assessments based on the ABK-KU App can be conducted at school in the classroom or an environment outside the classroom. This is expected to be useful for teachers in developing learning plans that are by the characteristics and individual abilities of students with special needs (Indriani et al., 2022; Marlina et al., 2023).

The ABK-KU application that has been developed achieves an overall development level of 88.85% on average, with very feasible qualifications, and can be used in carrying out developmental assessments. Supported by the results of previous research by (Anam, 2021).

This research contains the assessment process, including planning, implementation, and assessment, then child development reports and assessment results. Planning is the process of preparing things needed to conduct assessments, such as making instruments and individualized learning programs (Wong & Rashid, 2022). Assessment is the process of observing and documenting children's activities based on developmental aspects. Assessment is carried out based on observations made during the implementation of the assessment. Then, early intervention can be provided to support the growth and development process of students with special needs (Foorman et al., 2021).

The ABK-KU application is designed with attractive colors and features that make it easy for teachers to understand the use of the application. The ABK-KU application is valid and suitable for use in conducting developmental assessments. The ABK-KU application has instructions for using the application that are easy to understand because the presentation is clear and the language used is easy to understand. The development of ABK-KU in the developmental assessment process by integrating digital technology can enrich knowledge in the field of special education. In addition, this ABK-KU application makes it easier for teachers to conduct developmental assessments efficiently, structurally, and systematically.

Conclusion

The conclusion of this research finding is the validation results by material, media, and language experts show that this application has a high level of feasibility, namely 88.85%. The average percentage of the practicality assessment of the ABK-KU Application obtained a percentage of 92% with a very practical category. The pretest and posttest results obtained an average N-Gain score of 0.8356 (83.56%), while the Wilcoxon signed-rank test results showed a Z count of -5.234 and a significance value of 0.001. These results indicate that ABK-KU is easy to use by teachers and can present child development data in a structured and systematic manner, as well as provide program recommendations from the assessment results automatically. ABK-KU is worthy of being used as an alternative innovative solution to support the assessment of the development of students with special needs in special schools.

Recommendation

Teachers are expected to start utilizing the ABK-KU application as a tool in conducting developmental assessments of children with special needs more efficiently and systematically at school. For wider use, it is necessary to provide training on the use of the application so that teachers are able to optimize the available features and make the assessment results the basis for preparing individualized learning programs. Further research is recommended to test the effectiveness of this application on a wider scale.

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